Feb. 24, 1942. M. R. MOODY 2,273,980

ARTICLE OF FURNITURE

Filed Dec. 15, 1938 2 Sheets-Sheet 1

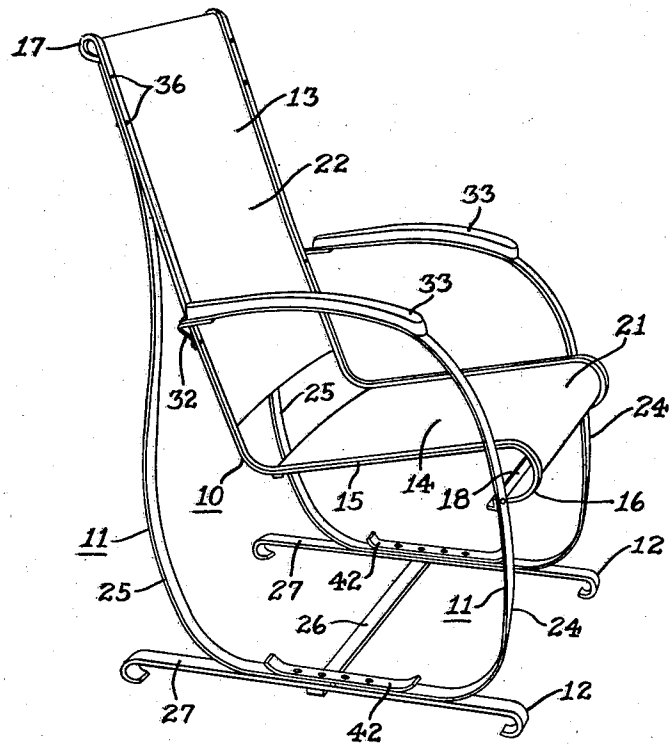


Fig. 1

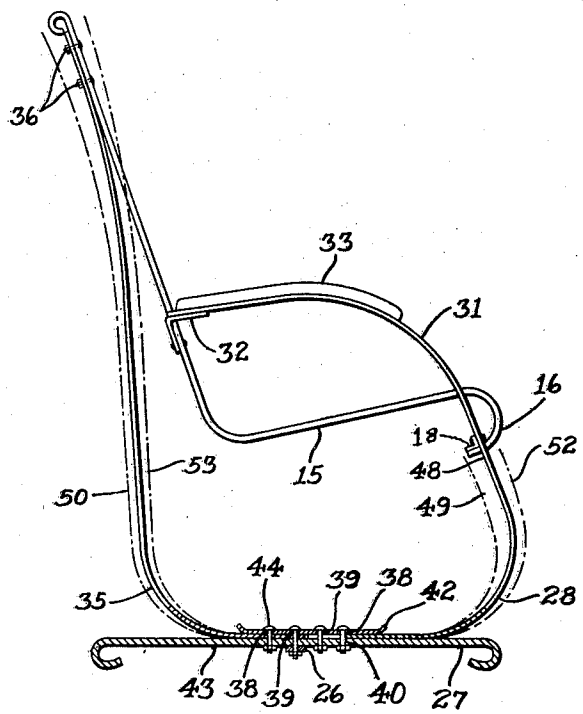


Fig. 4

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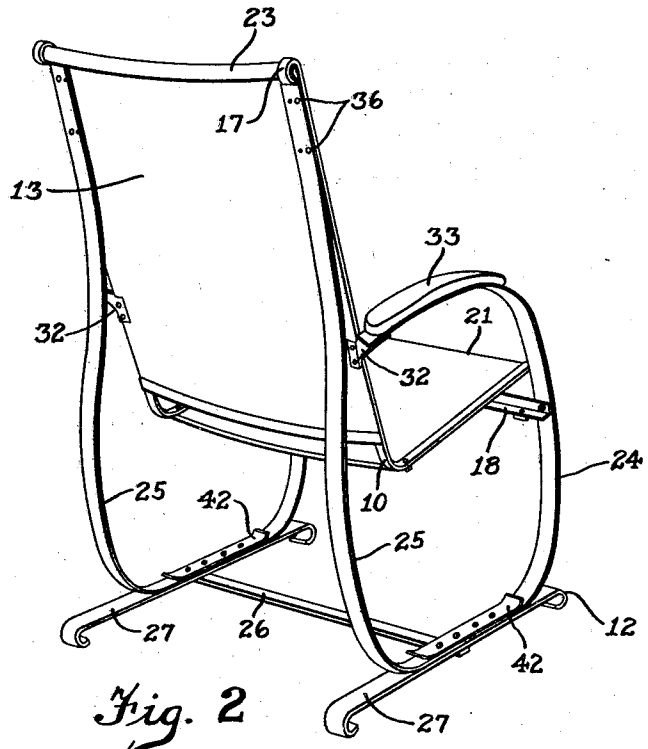


Fig. 2

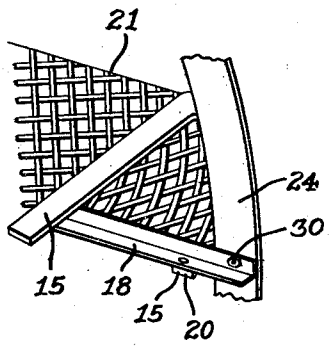


Fig. 3

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UNITED STATES PATENT OFFICE

2,273,980

ARTICLE OF FURNITURE

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Application December 15, 1938, Serial No. 245,902

6 Claims. (Cl. 155—54)

This invention relates to articles of furniture having a supporting portion yieldingly supported by flexible spring strips for back and forth rocking or swinging movement.

One object of the invention is the provision of an article of the character mentioned having a seat structure supported by a number of curved spring strips which are so arranged as to have a rolling flexure which shifts the bend or curve of the strips as to control and yieldingly limit the forward and rearward rocking movements of the seat.

Another object of the invention is the provision of an article of the character mentioned embodying a seat structure carried by forward and rear pairs of resilient spring strips the lower portions of which are reversely bowed and fixed to a rigid base structure with rolling flexure movements thereon.

Another object of the invention is the provision of a chair having a seat and a back rigid therewith, the forward end of the seat being supported by a pair of substantially C-shaped spring strips, and an upper portion of the back being supported by a pair of rear spring strips the lower portions of which are bowed oppositely to the front strips.

Another object of the invention is the provision of a chair of the character mentioned and including a plurality of pairs of curved spring strips which hold the seat structure, the several strips having upwardly extending portions which are securely fixed to the seat structure and which are effective in controlling or yieldingly limiting the forward and rearward movements of the seat.

Other objects and advantages of the invention will be apparent from the following description, the appended claims, and the accompanying drawings, in which a preferred embodiment of the invention is shown.

In the drawings in which like characters of reference designate like parts throughout the several views thereof:

Fig. 1 is a perspective view of a chair embodying the present invention;

Fig. 2 is a perspective view of the chair as viewed at an angle from the rear;

Fig. 3 is an enlarged perspective view showing the connection between one of the front spring strips and the front portion of the seat; and

Fig. 4 is a side elevation, partly in section, showing the form of the spring supporting strips and their relationship to the seat structure.

The invention hereof is shown, in its preferred embodiment, as applied to a chair having a seat structure 10 carried by spring means generally designated by reference numeral 11 which permits the seat to have a considerable degree of forward and rearward yielding swinging or rocking action while supporting the seat for some much smaller degree of vertical or cushioning movement. The lower portions of the spring means are mounted on a base 12.

The seat structure 10, as shown, comprises a back 13 and a seat 14. Extending along opposite sides of the seat structure and forming a rigid interconnection between the seat and the back are rigid metal straps 15 curved forwardly and downwardly at 16 at their forward ends, their upper ends being curved rearwardly and downwardly at 17. The downturned forward ends of the straps 15 are laterally interconnected by a rigid transverse brace 18, preferably an angle iron, which is secured at its opposite ends to the two straps 15 by means of welding or rivets 20 or the like. Welded or otherwise secured to the lower sides of the straps 15 and to the lower side of the brace 18 is a seat surface 21, preferably of foraminous or woven sheet metal. A second surface 22 of similar material is welded or otherwise secured to the rear sides of the upwardly projecting portions of the straps 15, the upper end of the surface 22 being curved to form a tube 23 which laterally spaces the upper ends of the straps 15. The ends of the tube 23 are enclosed by the bent portions 17 of the straps 15.

The spring means 11 by which the seat structure is carried comprises a front pair of curved spring strips 24, and a rear pair of spring strips 25, preferably constructed of thin spring steel having a normal curvature substantially as shown in Fig. 1. The lower end of each strip 24 extends substantially horizontally along the upper side of the base 12 which incorporates a pair of longitudinally extending rigid base members 27 welded or screwed to a transverse spacing bar 26. Each strip 24 extends along a base member 27 and then curves upwardly and forwardly to form a bowed portion 28. At a suitable distance above the base members 27 the strips 24 are connected to the seat structure by means of bolts 30 which extend through the extended ends of the brace 18. Each strip 24 preferably continues on past its connection with the brace 18 and curves upwardly and rearwardly so as to form an arm rest portion 31. At its rear end, each strip 24 is connected by means of an attaching bracket 32 to one of the straps 15 of the seat structure. An arm rest 33 of wood or other suitable material may be employed on the arm rest portion 31. Since the arm rest portion 31 of each strip

is connected at a plurality of spaced points to the seat structure it will be apparent that the angle of inclination of that portion of the strip which is attached to brace 18 is maintained substantially constant as the seat rocks back and forth.

The lower end of each rear strip 25 extends substantially horizontally along the upper side of its respective base member 27, and curves upwardly and rearwardly providing a bowed portion 35 which curves oppositely to the bowed portion 28 of the front spring strip. The upper portion of each spring strip 25, as shown in Fig. 4, is reversely curved with comparatively small curvature, the upper end of the strip being connected by screws or bolts 36 to the rear side of one of the straps 15, and extending along in contact with the rear side of the strap 15 for some distance and then being progressively spaced at gradually increasing distances from the strap 15 below its zone of contact with the strap. As shown, the zone of contact of the strap with the rear strip 25 is close to the top of the back portion of the chair, and thus considerably above the level of the connection between the front spring strips and the front of the seat, so as to give some degree of lateral stability to the seat structure.

The lower end of each of the spring strips is provided with holes 38 and 39, and each base member 27 is provided with four holes 40 equally spaced apart and having the same spacing as the holes 38 and 39. Arranged above each base member 27 and superimposed on the rear end of a forward strip 24 and the forward end of a rear strip 25 is a clamp plate 42 having a thickness to impart substantial rigidity, the clamp plate 42 being provided with four holes 43 corresponding in spacing to the holes 40 in the base member 27. Two readily removable bolts 44 passing through the clamp plate 42 and through the holes in the spring strips connect each spring strip rigidly to the base member. The clamp plate 42 extends a sufficient distance beyond the bolts 44 to prevent the spring strips 24 and 25 from bending at or near the holes 38. At its forward and rear ends each clamp plate 42 is slightly curved upwardly to gradually relieve the clamping action on the spring strips where the latter emerge from under the clamping plate. As shown the distance from the front end of a plate 42 to the nearest bolt hole is somewhat greater than the distance between the rear end of the plate and the rear bolt hole, although the equal spacing of the holes in the plate 42 permits the latter to be reversely applied in the assembly of the structure.

The rolling flexure which the spring strips have on the base members 27 with the resultant shifting of the bend in the spring, and the formation and attachment of the spring strips is such as to provide a controlled back and forth rocking action of the seat structure and to yieldingly limit the degree to which the seat may move forwardly and rearwardly. The limitation to the movement of the seat does not come suddenly but with a gradually increasing braking effect. The substantially C-shaped portion of the front spring strip 24 between its point of connection to the brace 18 and its lower end acts to yieldingly resist and limit rearward travel of the seat structure, for as the seat moves rearwardly the curvature of the bowed portion 28 is increased, the flexure of this lower portion, however, being distributed so that a large degree of bending action does not take place at any point. At the point where the front spring strip is attached to the seat structure just above the portion 48, see Fig. 4, its inclination is maintained as the seat moves rearwardly so that the portion 48 is substantially straightened as indicated by the dotted line 49, or may even assume a slight reverse bend. This straightening action or tendency to provide a reverse bend in the portion 48 of the strip, together with the increase of curvature which takes place in the bowed portion 28 yieldingly restrains excessive rearward movement of the seat.

As the seat moves rearwardly so that the front strips assume the position substantially as indicated by the broken line 49, the rear spring strips assume the position substantially as shown by the broken line 50 in Fig. 4, the lower portions of the strips 25 having a rolling flexure or bending action on the base members 27 and thus decreasing their curvature near the point where they meet the base member 27. The upper portion of each strip 25 of course moves rearwardly with the seat structure, and the rather gradual reverse bend provided in the upper portion of the strip has a straightening action which decreases the curvature of this reversely bent portion, thus increasing its ability to carry the weight of the occupant when the seat is displaced rearwardly. The rolling flexure of the lower portion of each rear spring strip as the seat moves rearwardly and produces a change in the curvature of the lower portions of the strip has some small tendency to yieldingly resist rearward movement, and an additional small braking effect is provided by reason of the straightening action of the upper portion of the strip and its flexing action on the upwardly projecting portions of the strap 15. However, the main braking or resisting effect restraining excessive rearward movement of the seat is provided by the front spring strips.

When the seat moves forwardly so that the front and rear spring strips assume the positions substantially as indicated by the dotted lines 52 and 53 respectively, the curvature of the bowed portions 28 is decreased, the lower end portions of the front strips increasing their area of contact with the upper side of the base member 27. There is also a slight increase in the curvature provided in the portion 48 near its point of connection to the seat structure. The front spring strips therefore permit rather free forward movement of the seat structure, the rear spring strips acting to restrain this forward movement and provide the main braking or restraining action which yieldingly limits the rocking action of the seat without suddenly stopping it. This restraining action of the rear spring strips is effective because of the increase in curvature which takes place in the lower bowed portion 35 as the area of contact between the lower end of the spring strip and the base member 27 decreases and as a greater and greater pressure or force is applied by the spring to the rear end of the plate 42. An increase in curvature of the upper portion of the rear spring strips also takes place as the seat moves forwardly, increasing the curvature of the strip at the point 54 below the zone of connection to the strap 15. The upper as well as the lower end of each rear spring strip therefore acts to yieldingly brake forward rocking movements of the seat structure and since the braking effect is rapidly but gradually increased as the seat moves forward, the seat cannot move

to such an extent as to create an unstable condition.

The spring construction and arrangement is such that as the seat moves forwardly from the full line position of Fig. 4, the forward end of the seat moves downwardly a small distance and in a gradual manner. As it moves rearwardly from its normal position the front end of the seat rises slightly and then moves substantially horizontally. The back of the seat moves substantially horizontally with a slight rise near the end of its forward movement and a slight drop near the end of its rearward movement.

The spring strips are so arranged, as will now be apparent, as to provide a maximum amount of flexibility or free movement to the seat structure without excessive straining of any point on the spring such as would result in breakage or short life of the spring, and the spring strip arrangement is also such as to permit the use of a comparatively small quantity of spring material while giving a very pleasing seat movement and caring for large variations in the weight of the load carried.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A seat of the character described comprising a seat structure including a seat and a back rigid therewith, a rigid supporting base, front and rear pairs of curved spring strips yieldingly supporting said seat structure for forward and rearward rocking movement, the lower portions of the front strips being forwardly bowed and rigidly connected at their lower ends to said base with rolling flexure thereon and rigidly connected to a forward part of said seat, the rear strips being bowed oppositely to the front strips and connected at their lower ends to the base to the rear of the front strips with rolling flexure on said base and at their upper ends to an upper portion of the back at a point considerably above the top of said front strips and above the seat.

2. A seat of the character described comprisin a seat structure including a seat and a back rigid therewith, a rigid supporting base, front and rear pairs of curved spring strips yieldingly supporting said seat structure for forward and rearward rocking movement, the front strips being of substantially C shape and connected to said base and having an upwardly extending portion secured fixedly to the front of said seat, the rear strips at their lower portions being arranged to the rear of the front strips and bowed oppositely to the front strips and extending upwardly to the top of the back and rigidly connected thereto.

3. A device of the character described comprising a seat structure including a seat and a back, longitudinally extending rigid base members below the seat structure, front and rear pairs of curved spring strips rigidly connected to the base members and connecting opposite sides of the seat structure to the base, the front strips extending substantially horizontally along the base with rolling flexure thereon then curving upwardly and forwardly and having an upwardly extending portion rigid with a forward part of said seat structure, the rear strips extending substantially horizontally along the base with rolling flexure thereon then curving upwardly and rearwardly and having an upwardly extending portion connected to the rear of the back near the upper end of the back.

4. A device of the character described comprising a seat structure including a seat and a back rigid therewith, a rigid base below the seat structure, front and rear pairs of curved spring strips rigidly oonnected to the base and connecting opposite sides of the seat structure to the base, the front strips each extending from the point of connection to the base substantially horizontally along the base for rolling flexure thereon then curving upwardly and forwardly and having an upper portion rigid with a forward part of said seat structure, the rear strips each extending from their point of connection to the base substantially horizontally along the base for rolling flexure thereon then curving upwardly and rearwardly and having an upper reversely curved portion of smaller curvature terminating in an upwardly extending end fixed to an upper part of said back.

5. A device of the character described comprising a seat structure including a seat and a back rigid therewith, supporting means at each side of the seat structure, each said supporting means comprising a substantially horizontally extending bottom portion, a flexible front leg curving upwardly and forwardly from said bottom portion and connected to the front of the seat, and a flexible rear leg curving upwardly and rearwardly from said bottom portion and then bending reversely with a smaller curvature and terminating in an upwardly extending end connected to an upper part of said back.

6. A device of the character described comprising a seat structure including a seat and a back rigid therewith, supporting means at each side of the seat structure, each said supporting means comprising a substantially horizontally extending rigid bottom portion, a flexible front leg curving upwardly and forwardly from said bottom portion and connected to the front of the seat, and a flexible rear leg curving upwardly and rearwardly from said bottom portion and then bending reversely with a smaller curvature and terminating in an upwardly extending end fixed to an upper part of said back, the reversely bent part of the rear leg having straightening movement when the occupied seat is moved to the rear.

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